

## Wilton Cupcake Chemistry

**Objective:** Children will experiment with cupcakes to see what happens when certain ingredients are left out. They will also see how four flavors of icing can be made from the same recipe by changing only one ingredient.

**Recommended Ages:** 9 years old and up

**Time required for project:** 90 minutes

### Overview

This project is designed to introduce children to the science of baking. They will make four different cupcakes, one using all the ingredients correctly, a second omitting the egg, a third omitting the baking powder, and a fourth omitting the oil. They will also experiment with the Wilton Treatology Flavor System to create different icing flavors from the same icing recipe, which they'll use to top off their cupcakes. Leaders should determine ahead of time how many adult helpers are needed. Depending on the age of the group, 1 adult for every 8 - 10 children should be enough.

**Note: A kitchen stove is required for this activity**

### Supplies

#### Wilton Items Needed:

- ✓ Treatology® Flavor System Flavors
- ✓ Creamy White Decorator Icing, 4 lb. tub – optional
- ✓ 9 in. Straight Spatula – 1 per child – optional
- ✓ 12 in. Disposable Decorating Bags (1 per child)
- ✓ Tip 1M (1 per child)
- ✓ Muffin Pan
- ✓ Cooling Grid
- ✓ Cupcake liners (in 4 different colors)
- ✓ Sprinkles -- optional

#### Provided by Leader - Shared:

- ✓ 4 Sets of measuring cups
- ✓ 4 Sets of measuring spoons
- ✓ 4 Large rubber spatulas
- ✓ 8 medium bowls (4 to prepare cupcake batter, 4 to mix flavors into icing)
- ✓ Ingredients for cupcake recipe on page 9, **quadrupled** (each of the 4 groups will be making a recipe)

#### Additional Kitchen Supplies (either leader can provide, or children can bring their own):

- ✓ Parchment paper, approximately one 5 in. x 7 in. sheet per child to practice rosettes on
- ✓ Spoon or small rubber spatula, 1 per child if not using Wilton 9 in. straight spatulas
- ✓ 1 one-gallon plastic storage bag per child to transport dirty tools home
- ✓ Scissors
- ✓ Ruler
- ✓ Rubber band, 1 per child
- ✓ Paper towels

- ✓ If not purchasing Wilton Buttercream Icing, make icing using the recipe on pg. 7 thinned to medium consistency, approximately 1/4 cup per child

## Project Outline

1. Introduction
2. Make Cupcakes
  - a. Divide Children into 4 Groups
  - b. Prepare Muffin Pan
  - c. Prepare the Batter & Bake
3. Flavor the Icing
4. Using a Decorating Bag
  - a. Preparing Bag with Tip
  - b. Filling Bag
  - c. Closing Bag
  - d. Holding Bag
5. Decorate the Cupcakes
  - a. Practice Rosette
  - b. Pipe Rosette on Cupcake
6. Results
7. Clean-up/Wrap-up

## INTRODUCTION

Provide quick overview of project

## MAKE CUPCAKES

### Divide Children into 4 Groups

- Assign each group a variation of the cupcake recipe on page 8. One group will prepare the recipe as is, while the other three groups will omit either the oil, egg, or baking powder.

### Prepare the Muffin Pan

- Use a different color cupcake liner for each row of three muffin cavities. Make a note of which color cupcake liner will be designated for which omitted ingredient.
  - #1 – Regular
  - #2 – No oil
  - #3 – No egg
  - #4 – No baking powder

### Prepare the Batter & Bake

- Have each group prepare the recipe, adjusting it based on their assigned ingredient to omit.
- Pour batter into assigned color liners and bake.



## FLAVOR THE ICING

\*Leader should make icing in advance using recipe on page 9 or purchase enough icing for each child to have 1/4 cup medium consistency icing.

\*Leader – While cupcakes are baking, have each group pick a different flavor to add to their icing. Divide icing evenly into 4 bowls, approximately ½ cup each, and add 1 drop of flavor of choice.

- Treatology Flavor System flavors
  - Highly concentrated and stronger than standard extracts and emulsions so add only 1 drop at a time, then taste and add more drops as needed.
  - Use a single flavor or mix and match flavors.
  - QuickCount chart offers several food flavoring combinations.
  - In addition to flavoring icing, these gourmet flavor extracts can be used to flavor cake, muffin, or pancake batter, cookie dough, and even milkshakes.

## USING A DECORATING BAG

### Preparing Bag with Tip

- With scissors, cut about ¾ in. off the tip of the bag.
- Trimming too much of the bag can cause the tip to pop out of the bag when in use so start with cutting less rather than more.
- Drop 1M tip inside bag and push to the bottom to expose about ½ of the tip out of the bottom of the bag.
- If necessary, trim more of the bag so the tip is properly positioned.

### Filling Bag

- Most important point in filling the bag is to NOT overfill it. A bag that is more than half full will be hard to control when piping and will make your hand tired faster.
- Hold bag in one hand and fold down the top of the bag to form a generous cuff over your hand.
- Using a spatula, fill bag with 1/4 cup of icing (about a handful).
- To remove icing from spatula, squeeze bag with spatula between fingers and pull the spatula out, using the bag and your fingers to squeeze the icing off.



\*Leader – Assist children with filling bags

### Closing Bag

- Unfold cuff and twist the top of the bag closed, forcing the icing down into the bag and tip.
- If desired, use a rubber band to secure the bag closed so no icing squeezes out of the top of the bag.



### Holding Bag

- Place the bag in the palm of your hand with the twist between your thumb and your forefinger.
- Curl your fingers around the bag so you can apply even pressure with your entire hand.
- As you decorate, periodically twist the bag and slide the rubber band down, to force the remaining icing down into the bottom of the bag and tip.
- Use the fingers of your other hand to steady the bag as you decorate.
- Squeeze the decorating bag as you guide it.



## DECORATE THE CUPCAKES

### Practice Rosette

**\*Leader – Explain and demonstrate on a piece of parchment paper how to pipe a large rosette. Have students practice rosettes on parchment paper. After practicing, icing can be scraped off paper and re-used.**

- Using decorating bag with the 1M tip, hold the bag straight up with the tip about ½ in. above the center of the surface. Squeeze out icing to form a star.
- Without releasing pressure, raise the tip slightly as you drop a tight line around the star in a complete rotation.

- When you complete the rotation, stop squeezing as you pull the tip away in the direction of the swirl.



**Pipe Rosette on Cupcake –** Once cupcakes have cooled, have children pipe rosettes on them. Add sprinkles, if desired.

## RESULTS

**Discussion Questions –** Encourage children to talk about their results and what they learned during the activity.

- Have the children taste each of the 4 different cupcakes. Compare the appearance, texture, size and taste of each. Of the 3 cupcakes that had a missing ingredient, which was the least favorite? Discuss why.
- Based on the cupcake results, have the students try to identify the role of each missing ingredient.
  - Oil
    - Oil is a fat (as is butter) and fats help baked goods be moister and more tender.
  - Eggs
    - Eggs become firm when heated so they add structure and help bind the ingredients together. They also help prevent crumbling.
    - The fat in the egg adds a tenderness and richness
    - Also adds color and flavor
  - Baking powder
    - Makes the cupcake rise. The more it rises, the lighter and more tender it will be.
    - When mixed in batter, it makes carbon dioxide bubbles that help the cupcake rise. As the cupcake bakes, the gas bubbles get trapped in the batter, which makes it light and fluffy.



- If any of these ingredients were omitted from a cookie recipe, how would it change the cookie?
- What flavor combinations would be interesting to try in a cupcake and/or icing recipe? Would the addition of certain natural flavors affect the baking process or the icing consistency? If so, what adjustments to the recipe might be necessary?

Now that your Girl Scouts have been introduced to the science of baking and working with icing, encourage them to learn more through the *Icing Fundamentals*, *Buttercream Flowers*, *Decorating Cookies and Fondant Fundamentals* class activities. Find the easy-to-follow leader guides and completion certificates at <http://classpromo.wilton.com/girlscouts>.

## **CLEAN-UP AND WRAP-UP**

INSPIRATION



## Cupcake Recipe

(Source: <https://teachbesideme.com/kitchen-chemistry-cake-experiment/#comments>)

3/4 cup flour  
1/3 cup + 2 tablespoons sugar  
1/8 + 1/16 teaspoon salt  
1/2 teaspoon baking powder  
6 tablespoons milk  
6 tablespoons vegetable oil  
3/4 teaspoon vanilla  
1 egg

Mix in the dry ingredients, then add the wet ingredients in the order listed. Mix well and pour into muffin pan lined with colored cupcake liners, using a different color cupcake liner for each round of batter.

1 recipe makes about 3-4 cupcakes. Repeat the recipe 3 more times, but with the following differences:

- For round 2, leave the oil out
- For round 3, leave the egg out
- For round 4, leave the baking powder out

Bake at 350° for 15-20 min.

## Wilton Buttercream Icing (Medium Consistency)

Makes 2 ¼ cups (enough for 8-9 children)

### INGREDIENTS:

1 teaspoon pure vanilla extract  
1/2 cup solid vegetable shortening  
1/2 cup (1 stick) butter or margarine, softened  
4 cups (1 lb.) sifted confectioners' sugar  
2 tablespoons + 2 teaspoons milk or water

### TOOLS:

Electric mixer with paddle attachment (or hand mixer with beaters)  
Large bowl  
Silicone spatula

- In large bowl, beat shortening and butter with electric mixer until light and fluffy. Beat in vanilla.
- Gradually add confectioners' sugar, one cup at a time, beating well on medium speed.
- Scrape sides and bottom of bowl often. When all sugar has been mixed in, icing will appear dry.
- Gradually add milk or water; beat at medium speed until light and fluffy.

### HINTS:

- Keep bowl covered with plastic wrap until ready to use
- If using a hand mixer, beat shortening, butter and liquids first, then add sugar, as above. Make one batch at a time to prevent hand mixer from overheating.
- Depending on the humidity and climate, it may be necessary to adjust the liquid and the sugar in your icing. If icing looks dry, add small amounts of liquid (1/4 to 1/2 teaspoon at a time). If icing is too wet, add 1 tablespoon of confectioners' sugar at a time.
- The key for both adjustments is adding small amounts until you achieve the right consistency. For medium consistency, a spatula in the icing will move slightly and start to lean but will not fall over.

